Refuge Manager, Tewaukon NWR
Cayuga, North Dakota

March 1, 1973

Chief, Land Management, Bismarck, North Dakota

1973 Water Program and 1972 Water Use Data

Your 1972 Water Use Data and 1973 Water Program have been reviewed and are approved.

Mr. Alfstad is to be complimented on his narrative of wildlife use of the various water areas. Your efforts to manipulate water levels to benefit various wildlife species are important. You should continue to document the management practice and the wildlife response. Applicability to other areas should also be considered.

We will look forward to the results of your talks with the citizens of Milnor regarding the management of Storm Lake.

KYLE J. SCHOONOVER

LJSchoonover:lv
cc: Regional Office, Denver w/att.

	Initial	Date
Wilson	JW	3/6
Brown		
Dundas		
Geber		
Hartman		
Katzenberger		
Kutcher		
Kortensen	RBM	3/16
Hall		
Young		
File		

ANNUAL WATER PROGRAM - TEWAUKON REFUGE

I. 1972 Water Use Data

IMPOUNDMENT DATA

Pool 1, Lake Tewaukon for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft)
Jan.	*1146.60	1220	7900	*1146.60	1220	7900
Feb.	*1146.60	1220	7900	*1146.60	1220	7900
Mar.	*1146.70	1224	8000	1149.10	1290	11050
Apr.	1147.80	1269	9360	1148.60	1285	10400
May	1147.80	1269	9360	1148.00	1273	9620
June	1147.40	1253	8870	1148.00	1273	9620
July	1147.30	1249	8740	1147.40	1253	8870
Aug.	1147.00	1240	8350	1147.30	1249	8740
Sept.	1146.20	1190	7400	1147.00	1240	8350
Oct.	1146.20	1190	7400	1146.30	1200	7500
Nov.	*1146.30	1200	7500	1146.30	1200	7500
Dec.	*1146.30	1200	7500	*1146.30	1200	7500

Pool 2, Cutler's Marsh for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft)
Jan.	*1151.30	230	900	*1151.30	230	900
Feb.	*1151.30	230	900	*1151.30	230	900
Mar.	*1151.30	230	900	1154.10	251	1620
Apr.	1151.90	240	1040	1152.70	245	1260
May	1151.90	240	1040	1151.90	240	1040
June	1151.00	230	830	1151.90	240	1040
July	1150.80	225	790	1151.30	230	900
Aug.	1151.20	230	880	1151.30	230	900
Sept.	1150.90	230	820	1151.20	230	880
Oct.	1150.80	225	790	1150.90	230	820
Nov.	1150.80	225	790	1151.40	235	930
Dec.	*1151.20	230	880	*1151.20	230	880

Pool 3, Maka Pool for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft)
Jan.	*1150.80	33	80	*1150.80	33	80
Feb.	*1150.80	33	80	*1150.80	33	80
Mar.	*1150.80	33	80	1156.70	127	710
Apr.	1151.85	64	155	1154.20	114	400
May	1151.85	64	155	1152.65	106	230
June	1150.75	32	70	1152.65	106	230
July	1150.60	32	70	1151.50	35	106
Aug.	1151.00	33	90	1151.50	35	106
Sept.	1150.35	32	60	1151.00	33	90
Oct.	1150.35	32	60	1150.60	32	70
Nov.	1150.60	32	70	1152.00	77	170
Dec.	*1151.30	34	110	*1151.30	34	110

*Reading, top of ice.

Pool 4 for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft)
Jan.	*1157.25	52	175	*1157.25	52	175
Feb.	*1157.25	52	175	*1157.25	52	175
Mar.	*1157.25	52	175	1161.35	110	400
Apr.	1158.00	68	202	1158.50	80	235
May	1158.50	80	235	1159.00	93	260
June	1158.05	68	210	1159.00	93	260
July	1158.00	68	202	1158.60	83	240
Aug.	1157.80	64	200	1158.60	83	240
Sept.	1157.00	48	165	1157.80	64	200
Oct.	1154.50	15	85	1157.00	48	165
Nov.	*1152.50	5	15	1154.50	15	85
Dec.	*1152.50	5	15	*1152.50	5	15

Pool 8, Hepi Lake for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft)
Jan.	*1174.50	101	250	*1174.50	101	250
Feb.	*1174.50	101	250	*1174.50	101	250
Mar.	*1174.50	101	250	1178.05	109	625
Apr.	1176.63	108	475	1178.05	109	625
May	1176.63	108	475	1179.00	110	730
June	1179.00	110	730	1179.00	110	730
July	1177.38	109	560	1179.00	110	730
Aug.	1175.38	106	340	1177.38	109	560
Sept.	1174.83	104	285	1175.38	106	340
Oct.	1174.60	102	260	1174.83	104	285
Nov.	*1174.40	99	240	1174.60	102	260
Dec.	*1174.40	99	240	*1174.40	99	240

Pool 11, West White Lake for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft)
Jan.	*1150.10	68	187	*1150.10	68	187
Feb.	*1150.10	68	187	*1150.10	68	187
Mar.	*1150.10	68	187	1151.20	82	267
Apr.	1151.00	79	250	1151.20	82	267
May	1151.00	79	250	1151.20	82	267
June	1150.90	78	245	1151.20	82	267
July	1150.70	75	230	1150.90	78	245
Aug.	1150.20	69	190	1150.70	75	230
Sept.	1149.80	65	167	1150.20	69	190
Oct.	1149.70	64	160	1149.80	65	167
Nov.	*1149.50	62	145	1149.70	64	161
Dec.	*1149.50	62	145	*1149.50	62	145

*Reading, top of ice.

Pool 12, East White Lake for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft)
Jan.	*1144.00	57	50	*1144.00	57	50
Feb.	*1144.00	57	50	*1144.00	57	50
Mar.	*1144.00	57	50	1144.50	65	85
Apr.	1144.50	65	85	1144.50	65	85
May	1144.50	65	85	1144.50	65	85
June	1144.50	65	85	1144.50	65	85
July	1144.00	57	50	1144.00	57	50
Aug.	1144.00	57	50	1144.00	57	50
Sept.	1143.50	50	20	1143.50	50	20
Oct.	1143.50	50	20	1143.50	50	20
Nov.	*1143.50	50	20	1143.50	50	20
Dec.	*1143.50	50	20	*1143.50	50	20

(Pool 12 gauge readings estimated for 1972, pool low, gauge considerable distance from water)

Pool 13, Mann Lake for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft)
Jan.	*1207.50	53	200	*1207.50	53	200
Feb.	*1207.50	53	200	*1207.50	53	200
Mar.	*1207.50	53	200	1210.00	60	340
Apr.	1210.00	60	340	1211.10	62	410
May	1210.00	60	340	1211.20	62	415
June	1209.50	59	310	1211.20	62	415
July	1209.20	58	295	1209.90	60	335
Aug.	1209.10	58	290	1209.90	60	335
Sept.	1208.60	57	260	1209.10	58	290
Oct.	1208.40	56	250	1208.60	57	260
Nov.	*1208.30	55	240	1208.40	56	250
Dec.	*1208.30	55	240	*1208.30	55	240

Pool 14, Sprague Lake for Calendar Year 1972

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac-ft)
Jan.	*1211.70	180	915	*1211.70	180	915
Feb.	*1211.70	180	915	*1211.70	180	915
Mar.	*1211.70	180	915	1212.30	184	1025
Apr.	1212.40	184	1045	1213.00	185	1160
May	1212.40	184	1045	1212.90	185	1140
June	1212.30	184	1025	1212.90	185	1140
July	1212.20	183	1005	1212.50	184	1060
Aug.	1212.20	183	1005	1212.50	184	1060
Sept.	1211.70	180	915	1212.20	183	1005
Oct.	1211.50	179	880	1211.70	180	915
Nov.	*1211.40	178	865	1211.50	179	880
Dec.	*1211.40	178	865	*1211.40	178	865

*Reading, top of ice.

Small Impoundments, 1972 (Hepi Lake Drainage)

(Minimum Monthly Elevation)

Month	Pool 2A	Pool 3A	Pool 5	Pool 6	Pool 7	Pool 7A
Jan.	*1151.86	*1154.80	*1159.55	*1167.44	*1171.70	dry
Feb.	*1151.86	*1154.80	*1159.55	*1167.44	*1171.70	dry
Mar.	*1151.86	*1154.80	*1159.55	*1167.44	*1171.70	dry
Apr.	1153.52	1154.75	1163.05	1165.44	1173.00	1' deep
May	1151.86	1154.75	1162.05	1165.00	1172.80	.5' deep
June	1151.11	1154.77	1162.05	1165.00	1168.60	dry
July	1151.11	1154.93	1162.63	1168.51	1168.60	dry
Aug.	1154.20	1156.75	1161.95	1168.44	1168.70	dry
Sept.	1153.65	1155.30	1158.72	1166.69	1167.50	dry
Oct.	1153.40	1155.00	1158.40	1166.30	1167.40	dry
Nov.	1152.00	1151.60	1155.95	1165.00	1167.40	dry
Dec.	1152.00	1151.60	1155.95	1165.00	1167.40	dry

(Maximum Monthly Elevation)

Month	Pool 2A	Pool 3A	Pool 5	Pool 6	Pool 7	Pool 7A
Jan.	*1151.86	*1154.80	*1159.55	*1167.44	*1171.70	dry
Feb.	*1151.86	*1154.80	*1159.55	*1167.44	*1171.70	dry
Mar.	1154.10	1157.10	1164.55	1168.61	1173.60	3'
Apr.	1154.10	1157.10	1164.55	1166.94	1173.60	3'
May	1153.52	1154.77	1163.05	1165.44	1173.00	1'
June	1151.86	1154.93	1163.05	1168.69	1172.80	dry
July	1154.20	1156.85	1163.05	1168.69	1168.70	dry
Aug.	1154.20	1156.85	1162.63	1168.51	1168.70	dry
Sept.	1154.20	1156.75	1161.95	1168.44	1168.70	dry
Oct.	1153.65	1155.30	1158.72	1166.69	1167.50	dry
Nov.	1153.40	1155.00	1158.40	1166.30	1167.50	dry
Dec.	1152.00	1151.60	1155.95	1165.00	1167.40	dry

*Reading, top of ice.

Tewaukon Refuge, Consumptive Water Use For 1972

Pool	A Avg. Annual Evap.	B 1972 Lake Rise	C Net Gain A+B	D Surface Acres	E Ac-Ft Gain CxD	F Outflow in Ac-Ft	G Total Inflow Ac-Ft E+F
16	2.65'	- .20	2.45	80	196	0	**
14	2.65'	- .30	2.35	183	430	Unk	"
13	2.65'	+ .80	3.45	59	204	Unk	"
12	2.65'	- .50	2.15	57	123	0	"
11	2.65'	- .60	2.05	74	152	0	"
10	2.65'	- .30	2.35	6	14	0	"
9	2.65'	- .10	2.55	5	13	0	"
8	2.65'	- .10	2.55	108	275	Unk	"
7A	2.65'	.00	2.65	0	0	Unk	"
7	2.65'	-4.30	-1.65	8	-13	Unk	"
6	2.65'	-1.14	1.51	6	9	Unk	"
5	2.65'	-1.15	1.50	8	12	Unk	"
4	2.65'	-4.75	-2.10	68	-143	Unk	"
3A	2.65'	-3.20	- .55	6	-3	Unk	"
3	2.65'	+ .50	3.15	54	170	Unk	"
2A	2.65'	+ .14	2.79	20	56	Unk	"
2	2.65'	- .10	2.55	233	594	Unk	"
1	2.65'	- .30	2.35	1245	2926	14,840	17,766

** Not calculated.

Outflow Data, 1972, In C.F.S.

Lake Tewaukon Structure

Date	March	April	May	June	July
1	*None	160.45	*34.10	*59.40	*2.00
2	0	160.45	36.00	53.40	1.00
3	0	*160.45	38.00	47.40	1.00
4	0	154.40	40.00	41.40	0
5	0	148.40	42.00	35.00	0
6	0	142.40	44.00	29.00	0
7	0	135.40	46.00	25.00	0
8	0	128.40	48.00	23.00	0
9	0	121.40	50.00	22.00	0
10	0	115.40	52.00	20.00	0
11	0	109.00	54.00	19.00	0
12	0	101.00	56.00	18.00	0
13	*0	95.00	58.00	17.00	0
14	10.00	89.00	59.00	16.00	0
15	20.00	82.00	*59.40	*14.05	*0
16	40.00	75.00	59.40	13.00	
17	*59.40	68.00	59.40	12.00	
18	81.00	62.00	59.40	11.00	
19	*105.75	*59.40	59.40	10.00	
20	135.75	56.40	59.40	9.00	
21	165.75	53.40	59.40	8.00	
22	*200.85	50.40	59.40	6.00	
23	240.00	47.40	59.40	4.00	
24	*266.70	44.40	59.40	2.00	
25	240.00	41.40	59.40	2.00	
26	220.00	38.40	59.40	2.00	
27	*200.85	35.40	59.40	2.00	
28	180.00	*34.10	59.40	2.00	
29	*160.45	34.10	59.40	2.00	
30	160.45	34.10	59.40	*2.00	
31	160.45	-	*59.40	-	
C.F.S. Total	2,647.40	2,637.05	1,666.90	526.65	4.00
Ac-Ft Total	5,251.04	5,230.51	3,306.24	1,044.59	7.93

C.F.S. Grand Total 7,482.00 Ac-Ft Grand Total 14,840.31

*This is known data, all other figures are interpolations.

Geological Gauging Station at Cayuga measured 22,478.7 Ac-Ft of outflow. However, this includes the Shortfoot Creek drainage which is separate from the Tewaukon Watershed.

SUMMARY OF 1972 WATER PROGRAM

Winter Conditions

Snow fell 16 days in January with 12 inches covering the ground by the end of the month. The Fargo Weather Bureau reported that the month of February was the coldest since 1936 with temperatures averaging 4.1 degrees below normal. Little snow fell in February, however. A warming trend began the second week of March which reduced the snowpack.

Spring Runoff

Wild Rice River Watershed

Spring runoff was light because of the lack of snow in the watersheds. Temperatures finally warmed to the high 30's by the 11th of March and were in the 50's by the following week which melted most of the snow.

Local runoff came into Mann Lake on March 13th. Mann Lake reached its peak spring elevation on March 18th when the pool read 1213.30. This was almost 6' higher than its level during the winter. Snow in the river channel downstream of Mann Lake bottle-necked outflow from the lake, hence the high reading. Mann Lake dropped to 1211.10 by April 3rd and was at 1210.00 by the end of the month.

Inflow into Sprague Lake began on March 14th. Sprague Lake gained 2.9' in elevation during March to a peak spring reading of 1214.60 on March 17th. The lake dropped to 1213.40 by March 29th and continued lowering to 1212.40 by the end of April. T-1A Watershed Dam which supplies water to Sprague Lake quit running by late April.

Pool 4 was at elevation 1157.25 over winter. Local runoff raised the pool to 1158.20 on March 13th. Snow and ice in the river channel upstream of Pool 4 backed up a considerable amount of water before it broke loose. When the ice and snow did let go, Pool 4 rose to elevation 1161.35 on March 19th, which is less than a foot from the top of the dike. Stoplogs were pulled on the 19th and the pool had dropped 1.5' by the 21st. Additional stoplogs were added to Pool 4 on April 19th to bring it up to summer management level. Greatest outflow from the pool was 579.75 cfs on March 19th. Outflow for the month averaged 188.76 cfs.

Pool 3 was at 1150.80 over winter and was in drawdown. It, too, reached a peak elevation on March 19th, at 1156.70. The pool had dropped to 1151.85 by the end of April.

Pool 2 was held at 1146.60 over winter. Water began flowing out of Pool 3 into Pool 2 on March 13th. Pool 2 reached a peak spring reading

of 1154.10 on March 22nd. By the end of April the pool had lowered to 1151.90 with little outflow recorded after that.

The watershed southeast of Lake Tewaukon began flowing on March 13th and water was observed going over the road south of Parker Bay (formerly Skroch's Bay but renamed Parker Bay during 1972 in connection with historical site location) on March 14th. Water continued flooding the road until the 18th. This watershed had all but dried up by March 27th. Pool 2 began spilling into Lake Tewaukon on March 15th. Tewaukon was ice-free by April 17th, about 8 days later than 1971. It dropped to 1147.80 by the end of April.

White Lake Watershed

The water level in West White Lake rose about one foot during spring runoff. East White Lake fluctuated little from local runoff. We can not read elevations on East White Lake as the pool has been pumped almost dry for waterfowl use and the water level is a considerable distance from the gauge. East White Lake was about 6" to a foot deep at the end of April.

Hepi Lake Watershed

Outflow from T-2 Watershed Dam reached Hepi Lake by March 14th, about the same as in 1971. Hepi Lake had raised from a winter reading of 1174.50 to 1178.05 by March 29th. The control gate on Hepi Lake was opened on April 3rd to fill downstream Pools 7, 6, 5, 3A, and 2A. Inflow into Hepi Lake had slowed to a trickle by April 7th. The gate on Hepi Lake was closed April 24th to allow water to drain from pools downstream that were leaking and needed repair.

Pool 7 peaked at 1173.60 from Hepi Lake outflow on March 29th. This was 1.9' higher than its winter reading. Pool 6 filled to elevation 1168.61 by March 19th but sprang a leak along the CMP on March 23rd so the pool was only about one-third full during the rest of the spring.

Pool 5 had filled by the end of March to elevation 1164.55. Pools 3A and 2A both had muskrat runs through their dikes which were repaired during the summer.

Summer and Fall Conditions

Wild Rice River Watershed

Rains in May and again in July (7" received in a one week period) in the hills south of the refuge started watersheds flowing again. Inflow from the Wild Rice River was recorded through the month of August.

Mann Lake rose 1.2' with above average precipitation in May. It fluctuated upward again during the July rains. At years end, Mann Lake is at elevation 1208.30, about .8' higher than last year.

The elevation of Sprague Lake fluctuated very little during the summer. A family of beaver moved in and plugged the culverts on the outlet of the lake this fall. Sprague Lake's elevation at freeze-up was 1211.40, essentially the same as last year. Sprague Lake continued to provide good northern and perch (up to 2 pounds) fishing this summer and winter.

Outflow was recorded from Pool 4 until the third week in June. Above average precipitation in July caused the pool to spill until late August. The pool was put into drawdown in late October to winterkill the carp in the pool and allow for waterfowl use. It held about 1' of water in the river channel at freeze-up.

Pool 3 was kept dry this summer but held some water (beaver dams) in the river channel. The Nickeson Dike that separates Pool 3 from private land was widened and the old borrow pit filled and resloped against the dike. The old dike has leaked yearly since Pool 3 was built so we never have been able to manage it effectively. We hope to have sealed the muskrat runs in the 43 year old dike, which we've essentially rebuilt.

Because Pool 3 was dry this summer we used the dozer to doze up 16 large nesting-loafing islands in the 130 acre pool. They should be used by ducks for loafing and maybe a pair or two of Canada geese for nesting next spring. Pool 3 held about three feet of water in the river channel at freeze-up.

Pool 2 held at 1151.+- after spring runoff. Dewatering Pool 4 this fall brought Pool 2's elevation up to 1151.20 at freeze-up, about the same as last year. Two beaver lodges are located in the upper end of the pool.

The water level in Pool 1 (Lake Tewaukon) held at 1147 during the summer. Water quality was poor with a large blue-green algae bloom in July and August. The lake had cleared by fall, however. Fishing for walleyes was good all year. Tewaukon was at 1146.30 at freeze-up which occurred November 29th, except for open water by the "Point". The ice on the lake was 8" to 14" thick at the end of the year.

White Lake Watershed

East White Lake we pumped almost dry in 1971. This summer it dried up further from evaporation and was about four to six inches deep at freeze-up. West White Lake held at 1150+ during the summer and dropped to 1149.50 at freeze-up. This was .6' lower than last years elevation.

Hepi Lake Watershed

Heavy rains south of Hepi Lake (Pool 8) in May filled T-2 Watershed Dam which supplies Hepi Lake. Hepi had filled to over-flowing by May 31st when water ran over the spillway. Water continued to flow over the spillway until July but no damage occurred. The lake remained full most of the summer and produced little sago this year. It was drawn down in August for fall waterfowl use and is three to four feet deep this winter.

Pool 7A was kept dry this summer. The bottom was farmed and seeded to a crop of millet which will be flooded in 1973 for pair and brood use.

Pool 7 we dried up in late June. We planned to burn out the heavy cattail growth in the upper end of the pool and cultivate the bottom but never got it done.

Pool 6 leaked along the CMP this spring but held some water until we fixed the leak in late June. The pool was then held full until September when we dried it up to kill out the minnows. It was two feet deep at freeze-up.

Pool 5 we kept full during the summer. This pool was also put into drawdown in September to winterkill the minnows which feed on invertebrates in competition with ducks.

Pool 3A dike leaked this spring. The leak was repaired in July and the pool flooded full. We also dewatered this pool during the fall.

The dike on Pool 2A leaked, too, from muskrat runs through the dike. The dike was repaired during the summer and the pool flooded as full as possible. The pool was dewatered as much as possible for the winter.

Potholes

Most potholes on the refuge are heavily overgrown with cattail and should be mowed or burned as they have received little waterfowl use the past three years when we have had almost no snow runoff to fill them. Water levels were somewhat better in 1972 than in the previous two years, however. Above average precipitation in May helped to sustain water levels until late June. Most Type III's on the refuge were dry by late July. We'll need a lot of runoff in the spring of 1973 to fill the dry pothole basins.

Food, Cover and Wildlife Use

Pool 1 was barren of emergent vegetation but had scattered growths of sago this year. Noticeable sago beds were on the north-central side, west bay and near the "Point". No broods were observed on the lake this year but up to 5,000 shovelers fed in Tewaukon during late October and November. A colony of western grebes nested in cattail in the west end of the lake.

Parker Bay (formerly Skroch's Bay) received little waterfowl use. Two duck broods were seen on the bay in the summer. Up to 615 whistling swans fed in the bay for a week during November. Carp kept the water in the shallow bay turbid most of the year.

The heavy growth of cattail in the upper end of Pool 2 provided an attractive moulting area for mallards during the summer. The dense cattail is important cover for the wintering deer herd that numbered 125 last spring. A few duck broods were observed in the upper end of the pool. A pair of Canada geese exhibited nesting behavior on a muskrat house but we found no nest. Wood ducks concentrated in the upper end of the pool in September and a large colony of western grebes nested there.

Pool 3 was used during the spring migration as it held some of the first open water on the refuge. It was dried up in the summer but a couple of old beaver dams provided some water in the river channel that runs through the pool. Shorebirds used exposed mudflats in the pool during the summer.

The upper end of Pool 4 is also used by moulting mallards and wood ducks used the area in the fall. Four or five broods were seen during the summer. Pelicans fished the area when it was dewatered this fall. A variety of shorebirds and gulls used the exposed mudflats in the upper end. American egrets preferred this pool to others.

Pool 2A was low during the spring and early summer. Little waterfowl use was noted on the pool except for numerous coots. However, we believe this is the pool on which a pair of Canada geese nested as a brood of 3 was seen on May 25th. They either nested on a muskrat house or artificial loafing island we'd dozed some time ago. These are the first geese ever hatched on the refuge.

Pool 3A was used some by coots but little else. The upper end is choked with cattail. The August 1972 Dowpon spraying killed the cattail in the north half of the pool, but the dead stalks remain. All the cattail should be burned off to open up the pool.

Pools 5 and 6 both had good fall waterfowl use. We used the shoreline of Pool 6 for a banding site this fall. Numerous shorebirds used the mudflats in Pool 6 when it leaked dry this spring.

Pool 7 was kept dry this summer. The upper end is heavily overgrown with cattail. American egrets used the shallow lower end of the pool as it was drying up.

Pool 7A was kept dry. The millet grown in the pool for flooding in 1973 was fed on by fall migrant ducks and geese in October.

Many ruddy ducks used Pool 8 in late April and early May. The pool

was barren of emergent vegetation during the year and little sago growth was noted because of high water levels. Up to 14,000 mallards watered there this fall, feeding in adjacent millet and barley fields on the refuge. The geese preferred the pool as a watering and resting area during the last half of October.

No broods were noted on Pools 9 and 10 this year. Pool 9 dried up in August. Shorebirds and gulls used the pool as it dried up.

Pool 11 was attractive to coots and redheads during the summer.

Pool 12 received the best waterfowl use per acre of any water area on the refuge this year. We'd pumped the pool almost dry in 1971 and this summer it was about one foot deep. Many shorebirds used the exposed shoreline all summer. A few duck broods were noted on the lake and from 2,000 to 5,000 ducks used the lake from July through the fall. No emergent vegetation was present but submergents grew abundantely. Pelicans used the lake for resting in late July and August, and it was the main goose roosting area for about the first three weeks of October. Geese had never used it before.

Pools 13 and 14 received little waterfowl use. They are essentially lakes from 5 to 7 feet deep, full of fish, and have no emergent vegetation. A couple of duck broods were observed in the drainage ditch which enters Sprague Lake from the south. Sprague Lake was used as a resting and watering area by geese during the fall.

Pool 16 (Anderson-Hoistad Unit) north of Mann Lake was a good redhead area this summer and fall. Emergents were abundant and a number of duck broods were seen. The pool should winterkill.

January 16, 1973 Ernest A. Alfstad, Refuge Clk.

1972 Easement Refuge Water Use - Tewaukon District

Few checks were made of easement refuges this summer.

The water level of Lake Elsie Refuge this fall was .4' higher than a year ago.

Water conditions in Storm Lake Refuge were about the same as last year.

There was little flow of water through the Wild Rice River Refuge after mid June. The river had dried up by the end of the year except for some water behind beaver dams.

Easement Refuges, Consumptive Water Use - 1972

Refuge	A Avg. Annual Evap.	B 1972 Lake Rise	C Net Gain A+B	D Surface Acres	E Ac-Ft Gain CxD	F Outflow in Ac-Ft	G Ttl-Inflow Ac-Ft E+F
Lake Elsie	2.65'	+.40	3.05	318	970	Unk.	Unk.
Storm Lake	2.65'	*+.10	2.75	181	498	Unk.	Unk.
Wild Rice	2.65'	*-1.00	1.65	3	5	22,479	22,484

*These are estimated figures.

Physical Condition of Structures

Lake Elsie

There are no control structures on this area.

Storm Lake

An Engineering inspection was made of the control structure on Storm Lake in October 1972. The control structure is in inoperable condition. To lower the water level of Storm Lake would require taking the silt out of the outlet ditch. Engineerings findings will be discussed further with the citizens of Milnor who are interested in improving the lake.

Wild Rice River

No control structures, beaver impoundment only.

1973 ANNUAL WATER PROGRAM

The Water Program is described for the Tewaukon Unit and for the Sprague Lake Unit. The Tewaukon Unit is described according to water source: Wild Rice River, Direct; White Lake Watershed; and Hepi Lake Watershed.

Tewaukon Unit

I. Wild Rice River Watershed, Direct

Pool 4

Pool 4 has generally been held nearly full in July and August since it was built in 1968. A cattail marsh developed in the tension zone. We plan to hold the pool shallow in early summer for pair use and then dry it up entirely. This will allow revegetation of the main lower pool to increase its productivity when reflooded. This will also give us some storage capacity to hold runoff water out of Pool 2, also to be in drawdown.

Pool 3

This can hold 1156.0 when full, but it has not been held full since Nickeson's dike developed a leak. We repaired the dike, raised it, and then in 1972 dozed the borrow pit full that parallels its upstream side. We feel we can now hold Pool 3 nearly full, to flood the upper end and the nesting islands dozed up in 1972. We hope to drown out some of the heavy cattail stands that developed in the years it has been held shallow.

Pool 2

This has been held at 1151.0 to 1152.0, or nearly full, since 1967. The cattail zone has increased in area. The marsh does not seem to be used much by summer waterfowl, except for moulting mallards. We believe a change is needed, and so will let this equalize with Lake Tewaukon. We expect it will be about 1148.0 in July and 1147.5 in August, perhaps a half foot lower. This will keep water out of the main cattail zone. In late fall we may be able to doze up loafing islands to break up this cattail zone. Moulters have used dead trees in the past but these are mostly all gone now. We hope to increase the productivity of Pool 2 for diving ducks by this management, which we hope will create more openings in the heavy cattail stands.

Pool 1

Lake Tewaukon will be held at 1147.5 as in the past plans. If the Parker Bay Marsh is actually built (it is planned and financed, unless funds are frozen), Tewaukon may have to be lowered for the construction. We expect to know this before spring runoff. If it has to be held low, then Pool 2 should be held brim full for the summer, to use the water to raise Tewaukon for the winter. We calculate if Cutler's Marsh were held at

1152.0 and Tewaukon at 1146.0, we could release 900 acre-feet from Cutler's Marsh and the two would equalize at about 1147.25. We would draw Cutler's Marsh down during late summer.

II. White Lake Watershed

Pool 11 - West White Lake

We cannot dewater this and have only local runoff to fill it. We will store all runoff in it up to flooding the county road to the south, or about 1151.0. Any water beyond this will have to be released to Pool 12, East White Lake.

Pool 12 - East White Lake

We took positive action in 1971 to increase the productivity of this lake. We pumped as much water out of it as Pool 11 would hold. Then in 1972 we pumped what we could and let evaporation work on the rest. The lake declined to about 0.8 foot of depth and received the heaviest water bird use in 1972 that we have observed in 10 years. We plan to continue the practice in 1973 and hope the lake will entirely dry up and grow a crop of millet and other wetland vegetative types. Thereafter, we believe it will be most productive operated as a seasonal wetland, i.e., let the natural runoff evaporate during the summer. About one foot of water in it is enough.

III. Hepi Lake Watershed

Pool 8

We have in the past operated Hepi Lake as a storage reservoir for downstream Pools 7A, 7, 6, 5, 3A and 2A. We believe this is not the most productive of waterfowl and waterbird use. Most of these pools have cattail - choked upper ends and deep lower ends, not conducive to intensive management for waterfowl use.

So in 1973 we plan to summerfallow 7, 6, 5 and fill 7A, 3A, and 2A full. Hepi Lake itself we will draw down to 1 to 2 feet deep, by gravity flow and pumping. Based on waterfowl response to East White Lake, we expect the use of Hepi Lake to be far greater than the sum of these pools as they have been managed in past years would be.

It will be rather easy to pump Hepi down, because we can use the outlet tube to pump through and will have no lift. We may have to pump 100 acre-feet, or one foot off the 100 acre lake. A heavy rain could undo this work by refilling Hepi from the T-2 reservoir, but if need be we can pump it again.

It should go into the winter shallow to kill any fish that may be in it and we believe carp are back.

Pool 9

This is north of Hepi Lake. The cattail shoreline needs to be burned

off but no water will be added. If it goes dry naturally, that will make it all the more productive when it gets water naturally. The alternative of filling it from Hepi Lake introduces minnows to it that render it useless for waterfowl.

Pool 10

No water is to be added here, either.

Pool 7A

A crop of millet here will be flooded as deep as possible. This depth is mainly to achieve a larger acreage of water, most all of which will be quite shallow, one to two feet. This will be to provide for pair use and brood use. The pool can be dewatered in mid August to allow it to be refarmed next year. This might be our most productive management of this pool - farm one year and flood it the next.

Pools 7, 6 and 5

They're cattail choked in the upper end and deep in the lower (see the graph of pool elevations included in our 1969 Water Program). Pools 7, 6 and 5 are all like this. All pools are really of little value to waterfowl when full, but when held low grow cattail. We should dry them all up this year and try to cultivate out the cattail. A good management idea would be to dike across each of these pools to separate the shallow upper end from the deep lower end. We could probably doze up such dikes or terraces to hold the water deeper in the upper ends of these pools. Otherwise we have to hold the pools at maximum elevations, which makes the lower ends 7 to 8 feet deep, in order to have enough water in the upper ends.

If the cattail can be cultivated out of these pools, the bottoms should be seeded to rye or millet for spring flooding in 1974. When Pool 7A is dewatered, it could be run through these pools slowly to prevent drowning out the crop, or the crop seeded afterwards.

Pools 3A and 2A

These should be held at maximum elevation and dewatered for the winter to keep muskrats out of the dikes.

Sprague, Mann, Pool 16

No control structures exist so no management of elevations is possible.

Potholes

We need to remove rock piles from them so that cattail and willows can be mowed and/or burned to keep them open enough for duck use.

Herbert G. Troester

January 16, 1973 Herbert G. Troester, Refuge Mgr.